

IN THE CLAIMS

1. (Original) A Packet Matching method, the method comprising:

- (a) providing a Rule Database comprising a plurality of classification rules, and providing a packet comprising a packet header to be classified;
- (b) creating a plurality of sub-databases from the plurality of classification rules in the Rule Database;
- (c) creating a plurality of Necessary Path Condition Rules wherein each Necessary Path Condition Rule corresponds to a sub-database;
- (d) determining which sub-databases to search, said determining further comprising comparing at least some of the packet header to the plurality of Necessary Path Condition Rules;
- (e) searching the sub-databases determined in step (d) for best matching classification rules; and
- (f) selecting the best matching classification rule.

2. (Currently Amended) The invention-method of claim 1 wherein the searching in (e) comprises searching in parallel.

3. (Currently Amended) The invention-method of claim 1 further comprising:

- (g) providing an additional packet to be classified; and
- (h) matching the additional packet according to steps (d), (e) and (f).

4. (Currently Amended) The invention-method of claim 1 wherein the sub-databases comprise at least T/3 classification rules, and wherein the sub-databases further comprise up to T

classification rules.

5. (Currently Amended) A method for organizing a Rule Database, the method comprising:
providing a Rule Database comprising a plurality of N classification rules, each
classification rule comprising W bits, wherein each bit of the W bits has a value
selected from the group consisting of 0, 1, and X;
constructing a hierarchical subdivision tree, comprising a single root, a plurality of nodes,
and a plurality of leaves, wherein the root, the nodes, and the leaves are interconnected
by a plurality of branches, wherein each branch corresponds to a value of a selected bit
of the W bits of at least a subset of the plurality of the N classification rules and
wherein a separate branch is constructed for each different value of the selected bit,
including the values 0, 1 and X, within the subset of the plurality of the N classification
rules; and
creating a plurality of sub-databases ~~such so~~ that traversing, via at least some of the
branches, any path from the root of the hierarchical subdivision tree through at least
some of the interconnected nodes to a leaf of the plurality of leaves will lead to a sub-
database, wherein each sub-database comprises a subset of up to T classification rules
of the plurality of N classification rules.
6. (Currently Amended) The ~~invention method~~ of claim 5 wherein each sub-database further
comprises a subset of at least T_{\min} classification rules of the plurality of N classification
rules.
7. (Currently Amended) The ~~invention method~~ of claim 6 wherein T_{\min} is less than or equal to
 $T/3$.

8. (Currently Amended) The ~~invention-method~~ of claims 5, 6, or 7 further comprising creating a plurality of Necessary Path Condition Rules wherein each of the Necessary Path Condition Rules corresponds to a sub-database, and wherein each of the Necessary Path Condition Rules of the plurality of the Necessary Path Condition Rules is comprised of the bit values associated with each traversed branch of the hierarchical subdivision tree while traversing the hierarchical subdivision tree from the root to the corresponding exactly one sub-database.
9. (Currently Amended) The ~~invention-method~~ of claim 5 wherein N is at least around 10,000.
10. (Currently Amended) The ~~invention-method~~ of claim 5 wherein W is at least around 32.
11. (Currently Amended) The ~~invention-method~~ of claim 5 further comprising inserting an additional rule to a sub-database.
12. (Currently Amended) The ~~invention-method~~ of claim 5 further comprising deleting an existing rule from a sub-database.
13. (Currently Amended) A Packet Matching system, the system comprising:
an All Matching Rules Engine to generate, based on a first subset of bits within a search value, selection signals that indicate which of a plurality of sub-databases are to be searched for a match to a second subset of bits within the search value;
a plurality of Best Matching Rules Sub-Engines to store the plurality of sub-databases and to search the sub-databases indicated by the selection signals for ~~a~~ at least one match to the second subset of bits within the search value; and
a Collate Engine coupled to said Best Matching Rules sub-Engines, and configured to select

a best one of the at least one match from the Best Matching Rules sub-Engines.

14. (Currently Amended) The ~~invention-system~~ of claim 13 wherein said All Matching Rules Engine further comprises a memory comprising a set of Necessary Path Condition Rules.
15. (Currently Amended) The ~~invention-system~~ of claim 14 wherein said memory comprises at least one of the following memories: CAM, DRAM, SRAM.
16. (Currently Amended) The ~~invention-system~~ of claim 14 wherein each of said Best Matching Rules sub-Engines further comprises a sub-database memory to store at least one sub-database of the plurality of sub-databases, the at least one sub-database of each of said Best Matching Rules sub-Engines corresponding to a respective rule of said Necessary Path Condition Rules.
17. (Currently Amended) The ~~invention-system~~ of claim 16 wherein said sub-database memory comprises at least one of the following memories: CAM, DRAM, SRAM.
18. (Currently Amended) The ~~invention-system~~ of claim 16 wherein said at least one sub-database of the plurality of sub-databases comprises a plurality of rules.
19. (Currently Amended) The ~~invention-system~~ of claim 16 wherein said at least one sub-database of the plurality of sub-databases comprises a plurality of forwarding entries.
20. (Currently Amended) The ~~invention-system~~ of claim 14 wherein each sub-database of said plurality of sub-databases corresponds to one of said Necessary Path Condition Rules, wherein said plurality of sub-databases are distributed among said plurality of Best Matching

Rules sub-Engines ~~such so~~ that concurrent activation of more than one Best Matching Rules sub-Engine of said plurality of sub-Engines is minimized.

21. (Original) A Packet Matching system comprising:

means for creating a plurality of sub-databases from a plurality of rules;

means for determining which sub-databases to search given a packet;

means for finding best rule matches among the determined sub-databases for the packet; and

means for selecting the highest priority best matching rule from among the found best rule matches.

22. (Currently Amended) The ~~invention system~~ of claim 21 wherein said means for creating further comprises an optimizing means for creating the plurality of sub-databases such that power dissipation is less than a threshold power level.

23. (Currently Amended) The ~~invention system~~ of claim 21 wherein said means for creating further comprises an optimizing means for creating the plurality of sub-databases such that storage requirements of each sub-database of the plurality of sub-databases is less than a threshold storage capacity.

24. (Currently Amended) The ~~invention method~~ of claim 13 wherein the plurality of Best Matching Rules Sub-Engines includes circuitry to search the sub-databases indicated by the selection signals for a match to the first subset of bits within the search value concurrently with searching the sub-databases indicated by the selection signals for a match to the second subset of bits within the search value.